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The Seminole Oil Pool

The World's Greatest Light Oil Pool

EDWARD V. O'ROURKE*

Introduction

Why is gasoline cheap? Why are the oil companies reporting lower earnings and passing or reducing dividends? The general answer is—Seminole.

Location

The oil pools comprising Greater Seminole listed in the order of their discovery are Seminole, Searight, Earlsboro, Bowlegs, Little River. These pools are located, in the east central part of Seminole County, Oklahoma, sixty miles southeast of Oklahoma City, the capital of the State.

Discovery

This, the world's greatest light oil pool was discovered on July 16, 1926, by the Independent Oil and Gas Company and R. F. Garland. The discovery well is known as No. 1 Fixico—Sec. 29-9-6. The initial production of this well was 2,000 barrels in 24 hours and up until the first of October, 1927, it had produced 100,000 barrels.

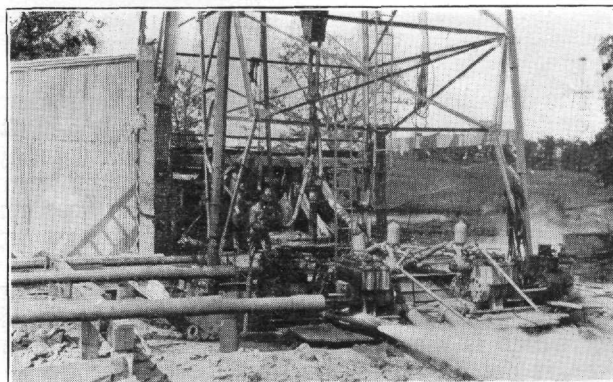
Geology

There are three or four producing sands in the Seminole pools but the main producing horizon is the First Wilcox sand. The First Wilcox is in the Upper Simpson formation of Ordovician age. It has an average thickness of 65 feet.

In describing the structural geology of Seminole, Luther White says "Dips on the producing horizon amounting to as much as 250 ft. or 350 ft. are encountered between offset wells (660 ft. apart) only to be reversed in the opposite direction by the next well. It has been called a wash-board type of structure and that seems as good a name as any. It is a system of close folds and domes over a broad general uplift."

The Wilcox sand is exceptionally soft, and is found at depths varying from 3900 ft. to 4850 ft. Initial productions as high as 12,000 barrels per day were attained in some wells.

The gravity of the oil in Greater Seminole va-



Floor of a Rotary Drill Rig in Seminole Pool

ries from 36.2 Baume to 43.2 Baume (a). The highest has been found in the Earlsboro pool. According to the U. S. Bureau of Mines analyses, Seminole crudes show a gasoline-naphtha content of from 34.1 to 42.3 percent.

Drilling Methods

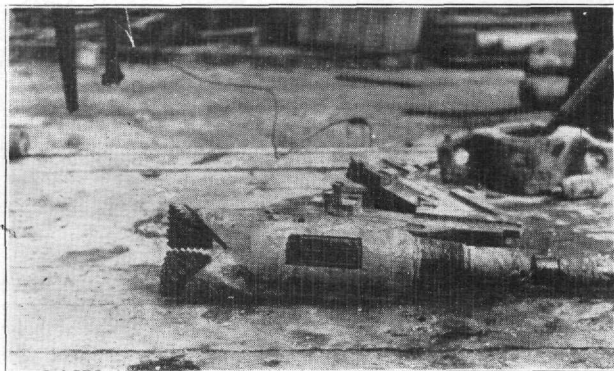
There are two general methods of oil well drilling in the United States, namely: churn drilling and hydraulic rotary. The hydraulic rotary system of drilling is used throughout the Seminole field.

In the hydraulic rotary system of drilling the rock mass through which the well is drilled is abraded and chipped away by the downward pressure and cutting and grinding action of a revolving steel bit which may assume various forms. The cutting bit is revolved by a substantial steel pipe or "drill stem," extending from the top of the drilling tool, to which it is screwed, to a point some distance above the derrick floor. At the level of the derrick floor the drill stem passes through a gripping device in a power driven rotary table over the mouth of the well. The form of the gripping device is such that while the table has a positive grip on the drill stem, the latter is free to move vertically through the table, even while it is in motion.

To the top of the column of pipe comprising the drill stem, a massive swivel is attached, which provides a means of suspending the stem in the well, allowing it to rotate with the table, while the upper part of the swivel, the hoisting block and supporting cables remain stationary.

The drill stem and swivel are hollow, so that water or mud can be pumped down through the stem to the drilling bit out into the well through

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Hughes Cone Rotary Drill Bit

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(a.) The Baume scale for liquids lighter than water has the following relation to specific Gravity:

$$\text{Specific Gravity} = \frac{140}{130 + \text{Degree Baume}}$$

Temperature should be 60° F.

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two holes, one on either side of the bit. This fluid sweeps under the bit, picks up the loosened rocky material and carries it to the surface through the annular space between the drill stem and the walls of the well.

Circulation is maintained by a pump connecting through an armored flexible hose to the swivel on top of the drill stem.

As the drill penetrates the formations additional hollow drill pipe is screwed to the top of the drill stem. *b.*

In the Seminole field a hole is drilled by rotary tools until rocks just above the Wilcox sand are reached. The drill hole is then cased with 6 $\frac{5}{8}$ inch pipe and afterwards completed with cable tools making a hole into the producing sand of 4 $\frac{3}{4}$ to 5 $\frac{1}{2}$ inches in diameter. Cable drilling consists of the rising and falling of a steel bit suspended from the derrick by a steel cable. Control of the length of a stroke is by means of a walking beam.

Drill holes are completed by cable to give a more accurate record of the material drilled thru. The action of the rotary mud and the danger of its scaling off oil sands have precluded the possibility of finishing a hole with rotary methods.

Practically all the drilling in Greater Seminole is done by contractors, although one company, the Carter Oil Company, did their own drilling. The contract cost of drilling with rotary method is \$8.00 per foot. A drilling crew consists of five men. A well 4,000 ft. deep can ordinarily be completed in forty-five days. The total cost of a completed well averages about \$50,000.

The derricks used in drilling are about 112 feet high and are built of wood and steel or all steel. The combination wood and steel derricks are safer than all-steel because they give warning when they start to collapse. There are dangers from falling tools and bad accidents occur from time to time.

Drilling is carried on 24 hours per day. At night each derrick has nine or ten bright lights strung from the drill floor to the sheave wheels on top for illumination.

Production Methods

Production methods used in the Seminole field are flowing, swabbing, pumping and air or gas lifting. Sixty to 70 per cent of all production is by means of air and gas lift. The gas lift as applied in oil production consists of forcing gas under pressure down between the casing and tubing and allowing it to expand and escape up through the tubing. While escaping and expanding, the gas lifts oil. The pressure must be sufficient to cause the oil to flow over the top of the casing at the well head and into the oil and gas separator tank. Initial pressures in starting the flow of oil are sometimes as high as 1,000 pounds per square inch, but the usual pressures after the well has once been brought to flow by air or gas is 375 to 400 pounds per square inch.

The Reed gas lift plant of the Pure Oil Company has 20 compressors, each of which delivered 300,000 cubic foot of free gas per 24 hours and

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lifted oil from wells 4100 feet deep. The plant served a territory of about $1\frac{1}{2}$ miles radius.

The advantages of air or gas lifting over other methods are listed by E. O. Bennet and K. C. Slater of the Marland Oil Company to be as follows:

- The lowering of lifting cost.
- Increasing the ultimate yield.
- Decreasing the time of obtaining the ultimate yield.
- The retardation of bottom water encroachment.
- The operation of deep wells where the cost of swabbing or pumping is prohibitive.
- Reduction of rig repair due to swabbing.
- The reduction of clean-out jobs and loss of producing time.
- Elimination of pumping repair jobs.
- Reduction of lease labor.
- Protection of wells by keeping them on steady production.
- The recovery of gasoline in excess of the amount recoverable by other means.
- The conserving of gas in the formation which is the most important factor in ultimate production.
- The air-gas lift method was introduced into the Mid Continent Fields about two years ago. It has had its greatest application on leases of the Seminole pool.

Production

Production on some leases in the Seminole field has to date been as high as 25,000 barrels per acre and it is expected that the ultimate yield will be 50,000 barrels per acre.

The Seminole field is the second field in the Mid Continent area to have experienced the services of an umpire. In the spring of 1927 Ray M. Collins was named official umpire in charge of the Seminole oil production. Shortly after his appointment the total output of all pools of the field was limited to a daily figure of 450,000 barrels. Wildcat well drilling in the outlying territory was to be limited to 100 barrels daily production. Normal decline placed the output of the field under the prescribed figure of 450,000 barrels in the latter part of August, 1927.

The peak of production of Greater Seminole was reached on July 30, 1927. The total amount produced that day was 527,000 barrels or roughly one-fifth of all the oil produced in the U. S. at the time.

The peak production of the various pools comprising Greater Seminole, the number of wells producing, and the dates are as follows:

Pool	Production	No. of Wells	Date
Seminole	264,989	204	2-20-27
Searight	41,141	43	6-15-27
Earlsboro	208,865	139	8- 9-27
Bowlegs	194,763	143	7-13-27

Little River was not thought to have reached its peak when this article was written.

Nearly every major Mid-Continent Petroleum Producing organization has production in the Seminole pools.

The Carter Oil Company heads the list in production with a grand total of 14,822,787 barrels having been produced up to October 1, 1927.

The total production in the field passed 100,000,000 barrels by October 1st, 1927. It is estimated by the first of September, 1928, the field will have had an output of 170,000,000 barrels.

Effect of Seminole on Petroleum Prices. (c)

The excess of production of petroleum over consumption this year is about 7 per cent of the total. At the beginning of 1927 about 525,000,000 barrels of crude petroleum and products were in storage. The excess production caused the crude oil price structure to crumble.

On October 31, 1926, the price of Mid-Continent 38 degree Baume Crude was \$2.45 per barrel and on October 1, 1927, the same crude sold for \$1.32 per barrel. Prices of all other grades of petroleum have been cut in proportion. Had the same prices been in effect on October 1, 1927, as of October 31, 1926, the producers would have received \$2,085,049 more per day for their output of crude oil.

The wholesale price of gasoline (58-60 Baume Gravity at Mid-Continent Refineries) has declined four cents per gallon in the year.

The October 1, 1927 quotation for gasoline of 58-60 Baume Gravity averaged 6 cents per gallon at Mid-Continent refineries against a quotation of ten cents the year before.

During the year 1927 there has been a decrease in market value of oil securities on New York stock and curb market exchanges of approximately one billion dollars.

Conclusion

Although many people believe that the oil reserves of the United States will be exhausted in six or seven years, we now find that production is greater than consumption and at least nine months' supply of petroleum products is above ground in storage. Due to the fact that a great percentage of our yearly petroleum consumption comes from newly discovered pools, there is always a danger of a petroleum shortage ahead.

I think the greatest benefit that will come from Seminole and its flood of oil is the fostering of a spirit of co-operation that has started among the leaders of the petroleum producing organizations in dealing with the curtailment of Seminole output. The co-operation should develop into a broad general policy of restriction of production to the demand for the product. The consuming public, investors, royalty owners, and the nation at large would benefit from such a policy of restriction and conservation.

(c) Some of the figures given here were obtained in the Oil and Gas Journal and the Lamp (Standard Oil of N. J. Publication).

A lecturer was telling of his experience in India. "Toss one of these fellows a coin, and he would draw it out into a wire of inconceivable fineness"

The brother leaned over to the innocent looking chap beside him. "No, no, Freshman, wire-drawers aren't to be worn."



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